

Midterm (T1 2013) Review KEY

UNIT 1

$$1) 3x - 5 - (2x + 4)$$

$$3x - 5 - 2x - 4 = \boxed{x - 9}$$

$$2) 7x^2 + 3x + 8 - (3x^2 + 5x - 3)$$

$$7x^2 + 3x + 8 - 3x^2 - 5x + 3 = \boxed{4x^2 - 2x + 11}$$

$$3) \begin{array}{r} 3x^2 + 5x + \\ -3x^2 - 5x \end{array} = \begin{array}{r} 8x^2 - 11x \\ -3x^2 - 5x \end{array}$$

$$\boxed{5x^2 - 16x}$$

$$4) 5x^2 + 6x - 4 - x(6 - x)$$

$$= 5x^2 + 6x - 4 - 6x + x^2 = \boxed{6x^2 - 4}$$

$$5) (\sqrt{3 - 4x})^2 = (3)^2$$

$$\begin{array}{r} 3 - 4x = 9 \\ -3 \quad -3 \end{array}$$

$$\begin{array}{r} -4x = 6 \\ -4 \quad -4 \end{array}$$

$$\boxed{x = -\frac{6}{4} = -\frac{3}{2} = -1.5}$$

$$6) \frac{-(-3) + \sqrt{(-3)^2 - 4(5)(2)}}{2(5)} = \frac{3 + \sqrt{9 + 40}}{10} = \frac{3 + \sqrt{49}}{10} = \frac{3 + 7}{10} = \boxed{1}$$

$$7) \frac{-(-5) + \sqrt{(-5)^2 - 4(3)(-8)}}{2(3)} = \frac{5 + \sqrt{25 + 96}}{6} = \frac{5 + \sqrt{121}}{6} = \frac{5 + 11}{6} = \frac{16}{6} = \boxed{2.\bar{6}}$$

$$8) R \cdot I = \frac{V}{R} \cdot R$$

$$\frac{R \cdot I}{I} = \frac{V}{I} \quad \boxed{R = \frac{V}{I}}$$

$$9) \begin{array}{r} 3x^2 + 7 = 4 \\ -7 \quad -7 \\ \hline \end{array}$$

$$\frac{3x^2}{3} = \frac{4-7}{3}$$

$$\sqrt{x^2} = \sqrt{\frac{4-7}{3}}$$

$$\boxed{x = \sqrt{\frac{4-7}{3}}}$$

$$10) \frac{PE}{mh} = \frac{mgh}{mh}$$

$$\boxed{g = \frac{PE}{mh}}$$

$$11) 4\sqrt{x^3} = x^{\frac{3}{4}}$$

$$12) \frac{2 \cdot x}{2 \cdot 7} + \frac{(x+3) \cdot 7}{2 \cdot 7} = \frac{2x}{14} + \frac{7x+21}{14} = \boxed{\frac{9x+21}{14}}$$

$$13) n^3 - 10$$

$$14) w = 5x - 3$$

$$15) x = -12, 12$$

$$16) \begin{array}{r} 2(x+7) = 3x-5 \\ 2x+14 = 3x-5 \\ -2x \quad \quad -2x \\ \hline 14 = x-5 \\ +5 \quad \quad +5 \\ \hline 19 = x \end{array}$$

UNIT 2

$$1) y = 4x - 3$$

$$x = 4y - 3 \Rightarrow \boxed{D}$$

$$2) \left(y = \frac{1}{4}x - \frac{3}{4} \right) \Rightarrow 4y = x - 3$$

$$4x = y - 3$$

$$\begin{array}{r} +3 \end{array}$$

$$4x + 3 = y$$

$$\boxed{f^{-1}(x) = 4x + 3}$$

$$3) (f \circ g)(x) = f[g(x)] = 3(x-1)^2 + 2$$

$$= 3(x-1)(x-1) + 2$$

$$= 3(x^2 - 2x + 1) + 2$$

$$= 3x^2 - 6x + 3 + 2 = \underline{3x^2 - 6x + 5}$$

$$f(x) = (f \circ g)(x)$$

$$3x^2 + 2 = 3x^2 - 6x + 5$$

$$\begin{array}{r} -3x^2 \end{array}$$

$$\begin{array}{r} 2 = -6x + 5 \\ -5 \end{array}$$

$$\begin{array}{r} -7 = -6x \\ -6 \end{array}$$

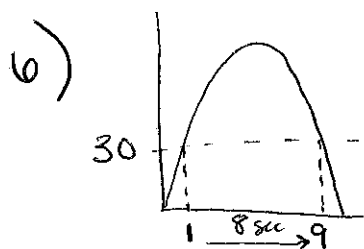
$$\boxed{x = \frac{7}{6}}$$

$$4) f(x+3) = 12(x+3) - 5$$

$$= 12x + 36 - 5 = \boxed{12x + 31}$$

5) $\frac{7}{x+6} \rightarrow$ can't divide by 0 $\quad - \frac{x+6}{6} = 0 \quad x \neq -6$

So my domain is all real numbers except $x = -6$



A. 1 sec and 9 sec

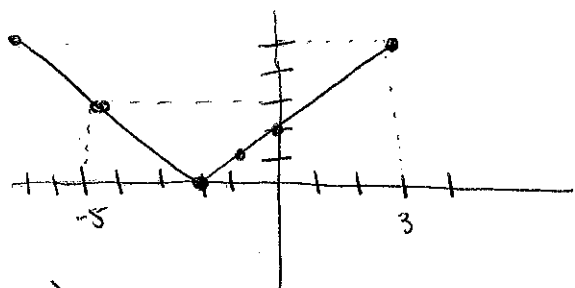
B. $9 - 1 = \underline{8 \text{ sec}}$

7) A. $(-\infty, 9)$ B. $[-2, \infty)$ C. $(3, \infty)$

8) $P(x) = R(x) - C(x)$
 $= 30x - (10x + 215)$
 $= 30x - 10x - 215 = \boxed{20x - 215}$

9) $f(-1) = \frac{(-1)^2 - 5(-1) + 4}{(-1) - 2} = \frac{1 + 5 + 4}{-3} = \boxed{\frac{10}{-3}}$

10) A. $40 + 7$ B. $7(40)$ C. 40^7 D. 7^{40}



11 B) $f(3) \Rightarrow$ what is y when $x = 3$?
 $= 5$

11 C) $f(-5) \Rightarrow$ what is y when $x = -5$?
 $= 3$

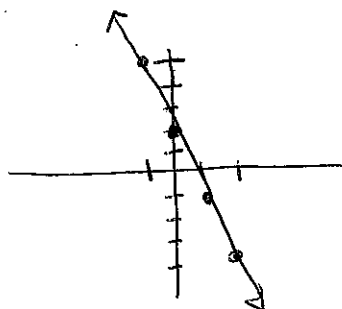
11) A. If you interpreted arrows at the ends $\rightarrow D: \mathbb{R}$ (all real #s)
 $R: [0, \infty)$

If you interpreted closed dots at the end $\rightarrow D: [-7, 3]$
 $R: [0, 5]$

UNIT 3

1)

x	y
-1	5
0	2
1	-1
2	-4



2) $P = 1,000 = 250n - 1,500$

$\begin{array}{r} +1,500 \end{array}$
 $\begin{array}{r} +1,500 \end{array}$

$$\frac{2,500}{250} = \frac{250n}{250} \quad \boxed{n = 10 \text{ bicycles}}$$

3) $X = \# \text{ white eggs}$ brown = $3X$ \leftarrow "three times as many brown eggs as white eggs"

white + brown = 124 $\Rightarrow X + 3X = 124 \Rightarrow \boxed{C}$

4)

1st 2nd 3rd

2s s 4s

"three as long as 2nd"

rope = 161 ft

$s = \text{length of second piece}$

$$2s + s + 4s = 161$$

Longest piece = $4s$

$= 4(23) = \boxed{92 \text{ ft}}$

$$\frac{7s}{7} = \frac{161}{7} \quad s = 23 \text{ ft.}$$

5) $C = \text{time to climb up}$ $Z = \text{time to zip down}$

"zip down 7 times as fast as I can climb" $\Rightarrow C = 7Z$

"climbing up + zip down takes 16 min" $\Rightarrow C + Z = 16$

$$\begin{aligned} 7Z + Z &= 16 \\ 8Z &= 16 \\ Z &= 2 \end{aligned}$$

$$C + Z = 16$$

$$\boxed{C = 14 \text{ minutes to climb}}$$

6) $a = \# \text{ adult tickets}$ $s = \# \text{ student tickets}$

$$\begin{aligned} \# \quad a + s &= 15 \\ \$ \quad 12a + 7s &= 150 \end{aligned}$$

$$\rightarrow \begin{bmatrix} 1 & 1 & 15 \\ 12 & 7 & 150 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 9 \\ 0 & 1 & 6 \end{bmatrix}$$

6 student tickets

7)

h	C
2	11
4	19
7	31

$+2 < \quad \quad \quad > +8$

$$M = \frac{8}{2} = 4$$

$$C = 4h + b$$

$$11 = 4(2) + b$$

$$11 = 8 + b$$

$$\begin{array}{r} -8 \quad -8 \\ \hline \end{array}$$

$$b = 3$$

$$\boxed{C = 4h + 3}$$

8) A, B, D

9) $a = 3n - 30 \Rightarrow a = 1n - 30$

• The slope changed from 3 to 1. Since the slope got smaller, the line got flatter.

10) $y = mx + b$

$$y = 4x + b$$

$$0 = 4(-5) + b$$

$$0 = -20 + b$$

$$\begin{array}{r} +20 \quad +20 \\ \hline \end{array}$$

$$20 = b$$

$$\boxed{y = 4x + 20}$$

11)

cost

$$\$20 + \$3 \text{ printing} \\ = \$23$$

If I sell for \$30, my profit

$$\text{on each hoodie is } \$30 - \$23 = \$7$$

$$\$500 / \$7 \text{ per hoodie} = 71.4$$

⇒ need to sell 72 hoodies

12)

$$y = -4x + 2$$

reflected

steeper

shift up 2

13)

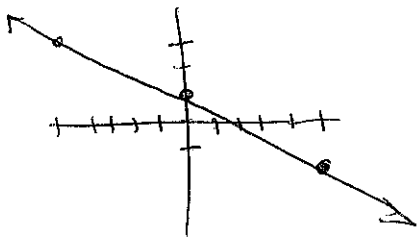
$$y = \frac{1}{3}x - 4$$

flatter

shift down 4

14)

$$y = -\frac{2}{5}x + 1$$



15)

$$y = \frac{3}{4}x$$

